THE COMPUTERIZATION OF MATERIAL SAFETY DATA SHEET INFORMATION

BY

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SUMMARY PAGE

PROBLEM:

Material safety data sheets are used by health professionals to determine possible health hazards posed by the use of various chemical compounds. The current methods of obtaining and sorting material safety data sheet (MSDS) information are cumbersome and time consuming.

FINDINGS:

Computer programs were specifically written to manipulate the voluminous data of MSDS's.

APPLICATION:

Our MSDS retrieval system was designed to improve the management of MSDS information primarily for DOD but may be applied to industry as well.

ADMINISTRATIVE INFORMATION

This work was carried out under the Naval Medical Research and Development Command Research Work Unit No. MF58.524.003-0002.
The report was submitted for review on 11 July 1983, approved for publication on 20 July 1983. It has been designated as NSMRL Memorandum Report No. 83-4.

ABSTRACT

FORTRAN computer programs were written in order to store and retrieve material safety data sheet (MSDS) information. The first program is used to add individual MSDS information to the master file whereas the second program allows the master file to be printed. The third and fourth programs allow for manipulation of the data in the master file such as searching and matching for specific information within the different information categories. Under development are programs used to extract certain data from the hazardous materials information system (HMIS) and incorporate them into our own MSDS system. When completed, our on-line hazardous compound records will number approximately 16,000.

INTRODUCTION

Part of a study for evaluating the limits of atmospheric contaminants in nuclear submarines work unit number MF58.524.003-0002 was to identify the chemical ingredients of substances used in the normal maintenance and operation of these vessels. Our method for completing this task was to obtain material safety data sheets (MSDS) for all 254 substances permitted aboard submarines. As we progressed in this endeavor, it became apparent that computerized storage and retrieval of MSDS information of some 30,000 different chemicals in more than 400,000 different products on the open market could vastly improve the ability of health professionals to help protect workers from chemical hazards in both the Department of Defense (DOD) and industry. For this reason we devised a computer program to manipulate MSDS data so it could be readily available to anyone who has a computer terminal and telephone link. The following is a description of how MSDS information can be of value and how our computer retrieval system works.

Federal law and regulations mandate that navy and maritime activities obtain MSDS's in order to have the necessary information so as to furnish safeguards to protect the life, health, and safety of their employees. MSDS's are available from most manufacturers on OSHA Form 20 "Material Safety Data Sheet" (appendix 1). The MSDS allows users of hazardous materials to ascertain the potential fire, toxic, or reactivity hazards which are likely to be encountered in their handling, application, or utilization and final disposal. Because the information on these sheets may be complicated or involve trade secrets, the industrial hygienists at a local safety and health office will usually keep the sheets on file and interpret the product data in order to inform workers of potential hazards.

METHODOLOGY

Our MSDS data is managed by a group of FORTRAN programs specially designed for this application (Appendix 2, 2a, 3, 4, and 5). All the data is stored in five indexed sequentially organized files and maintained on-line on a computer disk normally available for access 24 hours per day. Individual MSDS's are added to the master file by running a program which prompts the user for the various pieces of information such as the trade name, hazard code, chemicals, etc. (information categories, Appendix 6c), arranges them in the appropriate format and appends the new MSDS to the files. The MSDS is assigned a unique number determined by its order of entry into the file.

The entire master file or portions thereof can be printed under the control of another FORTRAN program. Each MSDS is formated with labels and arranged in the printout for easy identification (Appendix 7). The program prompts for a beginning MSDS number and an ending number thereby allowing any sequential subset of MSDS's to be printed.

A third program permits a search of the entire MSDS data base by presenting the user the menu of information categories. In order to retrieve specific data from an MSDS master file, the user specifies which category he would like searched and then enters a

string of characters spelling out the chemical, hazard code, trade name, etc. A search of the appropriate file is then done for the occurrence of the particular character string and the complete records of all MSDS's for which matches are found are automatically written into a separate disk file and printed (Appendix 8).

A fourth program reads the MSDS file and writes a user-selected specific information category file which is then sorted in alphabetical or numerical order (Appendix 9).

At present, correction to information in the data base can be made via a system text-editing utility program. A FORTRAN program is currently being written to provide this capability in a much simpler fashion. The new program will arrange information into the proper record locations under the design format and require the user only to verify the correction to the information in a given item of data.

These programs are now running on a VAX 11/750 central computer system (Digital Equipment Corporation). The processor is equipped with 1.5 megabytes of memory, 220 megabytes of on-line disk storage, and a dual density magnetic tape unit. The current MSDS master file consists of some 500 kilobytes of information and is resident on a 160 megabyte winchester-technology disk. There are currently 16 available ports to the VAX for user access, three of them being via phone lines. Authorized users need only dial into their accounts on the computer and issue run commands for the various programs of the VAX/MSDS system. The commands for operating the system are listed in Appendix 10.

FUTURE PLANS

DOD has instituted a hazardous material information system (HMIS) which provides reference data to assist in the management of hazardous materials so that the risks involved are minimized. The data provided on microfiche are compiled from MSDS sheets for approximately 15,000 chemical compounds listed in the Federal stock system and used by the armed forces. Although the HMIS is an excellent data base, the information is accessible only with a microfiche reader which we feel is a serious limitation. Another drawback of the HMIS system is that there is no effective method for locally surveying all the compounds for a particular chemical short of manually looking at all of the data sheets individually and noting those that have the chemical. When thousands of data sheets must be surveyed, the task becomes unmanageable. To solve this problem, we plan to extract certain data from the HMIS and incorporate them into our VAX/MSDS computer system. As previously explained, our computer system has the ability to rapidly search all the chemical files and list those MSDS's which have the chemical of interest. This feature will be especially valuable when conducting regional annual surveys of hazardous materials. In this respect, for example, plans call for the computer to be used to prepare lists of hazardous products used by various shops in the Naval Submarine Support Facility. A user code will be assigned to each shop or activity. Printouts of these lists will be sent to each shop periodically allowing them to compare the list with current stock and post hazard ratings where necessary.

A hazardous materials labelling program has recently been proposed at the Submarine Base by the Industrial Hygiene Branch of the Naval Submarine Medical Center in order to ensure that all workers are informed of the potential hazards of the products they use. The supply department will be responsible for labelling all incoming hazardous products with hazard warning decals. This hazard rating information will be supplied to them via the VAX/MSDS computer system which incorporates hazard ratings in the list of information. These ratings are assigned by the professional industrial hygienist and are not included in MSDS's from manufacturers on OSHA Form 20 or in the HMIS. A comparison of information categories found on OSHA Form 20, the HMIS, and our VAX/MSDS system is listed in Appendix 6. Also, the user code breakdown for our system is in Appendix 6.

A field test of this system is currently in progress. We anticipate further minor changes in the programs as the system is developed and beneficial suggestions from users are received. Also, as data entry and file management utilities are added to the VAX system, the MSDS programs will be upgraded to take advantage of them. A field test report will be issued in about one year.

APPENDIX 1

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.

ADDRESS *(Number, Street, City, State, and ZIP Code)*

CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS

CHEMICAL FAMILY	FORMULA

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	
VAPOR PRESSURE (mm Hg.)		PERCENT, VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (_____ =1)	
SOLUBILITY IN WATER			

APPEARANCE AND ODOR

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel

EXTINGUISHING MEDIA

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARDS

PAGE (1)

(Continued on reverse side)

Form OSHA-20
Rev. May 72

APPENDIX 1

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

EFFECTS OF OVEREXPOSURE

EMERGENCY AND FIRST AID PROCEDURES

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE		

INCOMPATABILITY *(Materials to avoid)*

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR		

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

WASTE DISPOSAL METHOD

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*

VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL *(General)*	OTHER

PROTECTIVE GLOVES	EYE PROTECTION

OTHER PROTECTIVE EQUIPMENT

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

OTHER PRECAUTIONS

```
************************************************************************
*                                                                      *
* PROGRAM TITLE :       DATASHEET                                      *
*                                                                      *
* WRITTEN BY :          DIETER BOESSMANN                               *
*                       COMPUTER APPLICATIONS                          *
*                       NSMRL                                          *
*                                                                      *
* PROGRAM INTENT :      THIS PROGRAM PROVIDES A DATA ENTRY SYSTEM FOR  *
*                       THE MATERIAL SAFETY DATA BASE PROJECT. THE     *
*                       PROGRAM UTILIZES THE GRAPHICS CAPABILITIES     *
*                       OF THE DIGITAL VT100 TERMINALS, SO IT MUST     *
*                       BE EXECUTED ON ONE THOSE TERMINALS.            *
*                                                                      *
************************************************************************

      CHARACTER*50 DASHES, INGRED(10), NEW_ID
      CHARACTER*40 MANUF, TRADE, NEW_MAN, NEW_TRD
      CHARACTER*20 STOCK, NEW_STK
      CHARACTER*15 PROTEC(7), NEW_PD
      CHARACTER*4  SH, USERS(99), NEW_SH, NEW_US
      CHARACTER*2  YEAR, NEW_YR
      CHARACTER    H, F, R, X, Y, Z, NEW_H, NEW_F, NEW_R, YN

      INTEGER*4    DATA_SH, NEW_DS, CHECK_DS, UNIQ_DS
      INTEGER*2    N_USERS, N_INGRED, N_PROT
      INTEGER      ANSWER

      BYTE ESC

      DATA DASHES/'------------------------------------------------------'/
      DATA ESC/'33/

************************************************************************
************************************************************************

      OPEN (UNIT=10, FILE='[BOESSMANN.MATSAFETY]MANUFAC.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=26,
     3     KEY=(1:4:INTEGER, 5:44:CHARACTER, 45:84:CHARACTER,
     4     85:104:CHARACTER), IOSTAT=IOS, ERR=9000)

*****   1:4     : DATA SHEET NUMBER
*****   5:44    : MANUFACTURER
*****   45:84   : TRADE NAME
*****   85:104  : STOCK/MANUF NUMBER

************************************************************************

      OPEN (UNIT=11, FILE='[BOESSMANN.MATSAFETY]HCODES.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=5,
     3     KEY=(1:4:INTEGER, 5:6:INTEGER, 7:8:INTEGER, 9:10:INTEGER,
     4     11:12:CHARACTER, 13:13:CHARACTER, 14:14:CHARACTER,
     5     15:15:CHARACTER, 16:19:CHARACTER), IOSTAT=IOS, ERR=9000)

*****   1:4     : DATA SHEET NUMBER
*****   5:6     : NUMBER OF USERS
*****   7:8     : NUMBER OF INGREDIENTS
*****   9:10    : NUMBER OF PROTECTIVE DEVICES
*****   11:12   : YEAR DATA SHEET OBTAINED
*****   13:13   : HAZARD CODE H
*****   14:14   : HAZARD CODE F
*****   15:15   : HAZARD CODE R
```

```
*****   16:19   : SPECIAL HAZARD CODE

**********************************************************************

      OPEN (UNIT=12, FILE='[BOESSMANN.MATSAFETY]USERS.DAT',
     1      STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2      RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=3,
     3      KEY=(1:4:INTEGER, 5:8:INTEGER, 9:12:CHARACTER),
     4      IOSTAT=IOS, ERR=9000)

*****   1:4    : UNIQUE KEY NUMBER (BASED ON DATA SHEET NUMBER)
*****   5:8    : DATA SHEET NUMBER
*****   9:12   : USER CODE

**********************************************************************

      OPEN (UNIT=13, FILE='[BOESSMANN.MATSAFETY]PROTECT.DAT',
     1      STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2      RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=6,
     3      KEY=(1:4:INTEGER, 5:8:INTEGER, 9:23:CHARACTER),
     4      IOSTAT=IOS, ERR=9000)

*****   1:4    : UNIQUE KEY NUMBER (BASED ON DATA SHEET NUMBER)
*****   5:8    : DATA SHEET NUMBER
*****   9:23   : PROTECTIVE DEVICE

**********************************************************************

      OPEN (UNIT=14, FILE='[BOESSMANN.MATSAFETY]INGRED.DAT',
     1      STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2      RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=15,
     3      KEY=(1:4:INTEGER, 5:8:INTEGER, 9:58:CHARACTER),
     4      IOSTAT=IOS, ERR=9000)

*****   1:4    : UNIQUE KEY NUMBER (BASED ON DATA SHEET NUMBER)
*****   5:8    : DATA SHEET NUMBER
*****   9:58   : INGREDIENT

**********************************************************************
**********************************************************************

      GOTO 99

 9000  PRINT *,'ERROR IN OPEN STATEMENT'

**********************************************************************

 99    CALL COVER          ! DISPLAY A COVER SHEET (EXTERNAL SUBROUTINE)

************************ INITIALIZE VARIABLES ************************

 100   N_USERS = 0
       N_INGRED = 0
       N_PROT = 0
       DATA_SH = 0
       MANUF = ' '
       TRADE = ' '
       STOCK = ' '
       SH = ' '
       H = ' '
       F = ' '
       R = ' '
```

```
      DO 102 I=1,99
        USERS(I) = ' '
 102  CONTINUE

      DO 104 I=1,10
        INGRED(I) = ' '
 104  CONTINUE

      DO 106 I=1,7
        PROTEC(I) = ' '
 106  CONTINUE

*****************************************************************************

      CALL CLEAR          ! CLEAR THE SCREEN
      CALL BOLD           ! PRINT IN BOLD TYPE

********************   FIRST SET OF INPUT PROMPTS   **********************

      TYPE 4, ESC, '02', '07', "33,"43,"66, 'MATERIAL SAFETY DATA ENTRY'
      TYPE 6, ESC, '05', '01', 'DATA SHEET NUMBER   _____'
      TYPE 2, ESC, '07', '01', 'MANUFACTURER    ', DASHES
      TYPE 2, ESC, '09', '01', 'TRADE NAME      ', DASHES
      TYPE 3, ESC, '11', '01', 'STOCK/MANUF CODE    ', DASHES
      TYPE 6, ESC, '13', '01', 'YEAR DATA SHEET OBTAINED   19__'

      CALL NORMAL

      TYPE 1, ESC, '05', '21'
      ACCEPT 10, DATA_SH

      TYPE 5, ESC, '05', '27', ESC, ESC, '07', '16'
      ACCEPT 12, MANUF

      TYPE 5, ESC, '07', '56', ESC, ESC, '09', '16'
      ACCEPT 12, TRADE

      TYPE 5, ESC, '09', '56', ESC, ESC, '11', '20'
      ACCEPT 14, STOCK

      TYPE 5, ESC, '11', '40', ESC, ESC, '13', '30'
      ACCEPT 15, YEAR

      TYPE 11, ESC, '13', '32', ESC

      CALL BOLD

*********************   ANY CHANGES NECESSARY ?   ************************

      TYPE 3, ESC, '15', '01', DASHES, DASHES

      TYPE 6, ESC, '17', '01', 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      TYPE 6, ESC, '19', '03', '1 ... TO CHANGE DATA SHEET NUMBER'
      TYPE 6, ESC, '20', '03', '2 ... TO CHANGE MANUFACTURER'
      TYPE 6, ESC, '21', '03', '3 ... TO CHANGE TRADE NAME'
      TYPE 6, ESC, '22', '03', '4 ... TO CHANGE STOCK/MANUF CODE'
      TYPE 6, ESC, '23', '03','5 ... TO CHANGE YEAR DATA SHEET OBTAINED'
      TYPE 7, ESC, '24', '03', '6 ... TO CONTINUE', ESC, '17', '44'

      CALL NORMAL

 105  TYPE 5, ESC, '17', '44', ESC, ESC, '17', '44'
```

```
      ACCEPT 27, ANSWER

      GO TO (200, 250, 300, 350, 400, 450), ANSWER

*****************************************************************
*                                                               *
*       THE CODE WHICH CHANGES ANY PREVIOUS INPUT IS ALL BASICALLY     *
*    IN THIS FORMAT :  FIRST, ERASE THE OLD ANSWER, PUT UP NEW          *
*    SPACES AND MOVE THE CURSOR IN POSITION TO ACCEPT THE NEW ANSWER.   *
*    IF THE PERSON CHANGES HIS MIND, HE HITS RETURN.  THIS PUTS         *
*    A BLANK, OR ZERO, INTO THE NEW VALUE (EG., NEW_DS). IN THIS        *
*    CASE, THE OLD ANSWER MUST BE PUT BACK ON THE SCREEN.               *
*                                                               *
*****************************************************************

 200  TYPE 8, ESC, '05', '21', ESC, ESC, '05', '21', '______'
      TYPE 1, ESC, '05', '21'
      ACCEPT 10, NEW_DS
      IF (NEW_DS .NE. 0) THEN
        DATA_SH = NEW_DS
      ELSE
        TYPE 9, ESC, '05', '21', DATA_SH
      ENDIF
      TYPE 11, ESC, '05', '25', ESC
      GOTO 105

 250  TYPE 25, ESC, '07', '16', ESC, ESC, '07', '16', DASHES
      TYPE 1, ESC, '07', '16'
      ACCEPT 12, NEW_MAN
      IF (NEW_MAN .NE. ' ') THEN
        MANUF = NEW_MAN
      ELSE
        TYPE 6, ESC, '07', '16', MANUF
      ENDIF
      TYPE 11, ESC, '07', '56', ESC
      GOTO 105

 300  TYPE 25, ESC, '09', '16', ESC, ESC, '09', '16', DASHES
      TYPE 1, ESC, '09', '16'
      ACCEPT 12, NEW_TRD
      IF (NEW_TRD .NE. ' ') THEN
        TRADE = NEW_TRD
      ELSE
        TYPE 6, ESC, '09', '16', TRADE
      ENDIF
      TYPE 11, ESC, '09', '56', ESC
      GOTO 105

 350  TYPE 26, ESC, '11', '20', ESC, ESC, '11', '20', DASHES
      TYPE 1, ESC, '11', '20'
      ACCEPT 14, NEW_STK
      IF (NEW_STK .NE. ' ') THEN
        STOCK = NEW_STK
      ELSE
        TYPE 6, ESC, '11', '20', STOCK
      ENDIF
      TYPE 11, ESC, '11', '40', ESC
      GOTO 105

 400  TYPE 8, ESC, '13', '30', ESC, ESC, '13', '30', '__'
      TYPE 1, ESC, '13', '30'
      ACCEPT 15, NEW_YR
      IF (NEW_YR .NE. ' ') THEN
```

```
        YEAR = NEW_YR
      ELSE
        TYPE 6, ESC, '13', '30', YEAR
      ENDIF
      TYPE 11, ESC, '13', '32', ESC
      GOTO 105

*****************************************************************************
*                                                                           *
*       ONCE THE USER HAS APPROVED OF THE ANSWERS HE HAS GIVEN FOR          *
*     THE FIRST SET OF INPUTS  (BY ENTERING A 6 - TO CONTINUE), THE         *
*     DATA SHEET NUMBER HE HAS GIVEN MUST BE 'OKAYED'.  BECAUSE OF          *
*     THE INDEXED SEQUENTIAL ACCESS METHOD OF THE DATA FILES, THE           *
*     FIRST KEY (DATA SHEET #) MUST BE UNIQUE.  THUS, BEFORE GOING ON,      *
*     THE PROGRAM CHECKS FOR ANY PREVIOUS OCCURRANCES OF THE GIVEN          *
*     DATA SHEET NUMBER.  IF IT IS FOUND TO BE ALREADY STORED, THE          *
*     USER IS FORCED TO GIVE THE CORRECT ONE, OR END THIS ENTRY             *
*     SESSION.                                                              *
*                                                                           *
*       IN THE READ STATEMENT, THE GIVEN VALUE IS LOOKED FOR                *
*     ( KEY=DATA_SH ).  IF IT IS NOT FOUND (AS EXPECTED), AN ERROR          *
*     CONDITION OCCURS AND CONTROL TRANSFERS TO LINE 455.                   *
*                                                                           *
*****************************************************************************

 450  READ (UNIT=10, KEY=DATA_SH, KEYID=0, ERR=455) CHECK_DS

      TYPE 18, ESC, '17', '01', ESC

      CALL BOLD

      TYPE 20, ESC, '17', '01', 'THIS DATA SHEET NUMBER HAS ALREADY',
     1         ' BEEN USED; IT MUST BE UNIQUE.'
      TYPE 6, ESC, '19', '01', 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      TYPE 6, ESC, '20', '03', '1 ... TO CORRECT DATA SHEET NUMBER'
      TYPE 6, ESC, '21', '03', '2 ... TO ENTER A DIFFERENT DATA SHEET'
      TYPE 6, ESC, '22', '03', '3 ... TO END THIS SESSION COMPLETELY'

      CALL NORMAL

      TYPE 1, ESC, '19', '44'

      ACCEPT 27, ANSWER

      GOTO (452,100,9999), ANSWER

 452  TYPE 8, ESC, '05', '21', ESC, ESC, '05', '21', '______'
      TYPE 1, ESC, '05', '21'
      ACCEPT 10, NEW_DS
      IF (NEW_DS .NE. 0) THEN
        DATA_SH = NEW_DS
      ELSE
        TYPE 9, ESC, '05', '21', DATA_SH
      ENDIF
      TYPE 11, ESC, '05', '27', ESC
      GOTO 450

*****************************************************************************
*                                                                           *
*       IN THE FILES USERS.DAT, PROTECT.DAT AND INGRED.DAT, MORE            *
*     THAN ONE USER (ETC.) IS POSSIBLE FOR ANY ONE DATA SHEET.  THUS        *
*     IN STORING THIS DATA, THE SAME DATA SHEET NUMBER APPEARS ON           *
*     MANY LINES.  SINCE A UNIQUE NUMBER IS NEEDED FOR THE PRIMARY          *
```

```
*     KEY IN STORING THIS DATA, ONE IS MADE, BASED ON THE DATA SHEET     *
*     NUMBER.  UNIQ_DS IS CALCULATED, (SEE BELOW)  IN WRITING THE DATA   *
*     TO THE FILE, 1 IS ADDED TO UNIQ_DS AND USED AS THE UNIQUE KEY      *
*     FOR THE FIRST USER;  2 IS ADDED FOR THE SECOND USER AND SO ON.     *
*                                                                        *
**************************************************************************

 455  UNIQ_DS = 100 * DATA_SH

**************************************************************************
*                                                                        *
*       CLEAR SCREEN, LEAVING TITLE AND DATA SHEET NUMBER.               *
*     PRINT SECOND SET OF INPUT PROMPTS.                                 *
*                                                                        *
**************************************************************************

      TYPE 18, ESC, '06', '01', ESC

      CALL BOLD

      TYPE 6, ESC, '07', '01', 'HAZARD CODES :'
      TYPE 6, ESC, '08', '05', 'H  _'
      TYPE 6, ESC, '09', '05', 'F  _'
      TYPE 6, ESC, '10', '05', 'R  _'
      TYPE 6, ESC, '07', '37', 'SPECIAL HAZARD CODE   ____'
      TYPE 6, ESC, '12', '01', 'USER CODES :'
      TYPE 6, ESC, '13', '05', '____   ____   ____   ____   ____'
      TYPE 1, ESC, '01', '01'

      CALL NORMAL

      TYPE 1, ESC, '08', '08'
      ACCEPT 16, H

      TYPE 5, ESC, '08', '09', ESC, ESC, '09', '08'
      ACCEPT 16, F

      TYPE 5, ESC, '09', '09', ESC, ESC, '10', '08'
      ACCEPT 16, R

      TYPE 5, ESC, '10', '09', ESC, ESC, '07', '59'
      ACCEPT 17, SH

      CALL BOLD

**************   PRINT OUT USER CODE INPUT GUIDE LINES   **************

      ASSIGN 458 TO IRETN

      TYPE 3, ESC, '15', '01', DASHES, DASHES
 457  TYPE 20, ESC, '17', '01', 'WHEN ENTERING USER CODES ',
     1              'PLEASE FOLLOW THESE GUIDE LINES'
      TYPE 19, '  1. IF THERE ARE NO USER CODES, ENTER  ''NK'''
      TYPE 19, '  2. PRESS ''RETURN'' AFTER EACH CODE'
      TYPE 21, '  3. ENTER USER CODES 5 AT A TIME UNTIL ALL CODES',
     1         ' HAVE BEEN ENTERED'
      TYPE 19, '  4. WHEN ALL CODES HAVE BEEN ENTERED, PRESS ''RETURN'''

      CALL NORMAL

      GOTO IRETN

 458  TYPE 11, ESC, '07', '63', ESC
```

```
*************************************************************************
*                                                                       *
*       USER CODES ARE INPUT IN A DO LOOP SINCE THEY ARE STORED         *
*     IN AN ARRAY.  BLANKS FOR USER CODES ARE PUT ON THE SCREEN         *
*     FIVE AT A TIME.  WHEN CARRIAGE RETURN IS DETECTED (AS A BLANK)    *
*     CONTROL IS TRANSFERRED OUT OF THE LOOP.                           *
*                                                                       *
*************************************************************************

      DO 500 I=0,19
        DO 500 J=1,5

        L = (J*7) - 2

        IF (J .NE. 1) THEN
           L = L - 3
        ENDIF

        Y = CHAR (L/10 + 48)
        Z = CHAR (L - 10*(L/10) + 48)

        IF (J .EQ. 1) THEN
           TYPE 22, ESC, '13', Y, Z
        ELSE
           CALL BOLD
           TYPE 23, ESC, '13', Y, Z, '    ____'
           CALL NORMAL
           L = L + 3
           Y = CHAR (L/10 + 48)
           Z = CHAR (L - 10*(L/10) + 48)
           TYPE 22, ESC, '13', Y, Z
        ENDIF

        K = (I*5) + J
        IF (K .EQ. 100) GOTO 505
 498    ACCEPT 17, USERS(K)
        IF (J .EQ. 5) THEN
           CALL BOLD
           TYPE 8, ESC, '13', '37', ESC, ESC, '13', '05',
     1           '____  ____  ____  ____  ____'
           CALL NORMAL
        ENDIF

        IF (USERS(K) .EQ. ' ') THEN
           TYPE 18, ESC, '17', '01', ESC
           CALL BOLD

*****  VERIFY THAT THEY MEANT TO HIT RETURN

           TYPE 20, ESC, '17', '01', 'ARE YOU FINISHED ENTERING USER ',
     1           'CODES ?  (Y/N)  '
           CALL NORMAL
           TYPE 1, ESC, '17', '48'
           ACCEPT 16, YN
           IF (YN .EQ. 'Y') GOTO 505
           TYPE 18, ESC, '17', '01', ESC
           CALL BOLD
           ASSIGN 499 TO IRETN

*****  WRITE OUT USER CODE INPUT INSTRUCTIONS AGAIN

           GOTO 457
```

```
499         TYPE 22, ESC, '13', Y, Z
            GOTO 498
          ENDIF

500   CONTINUE

505   N_USERS = K - 1
508   TYPE 18, ESC, '17', '01', ESC

      CALL BOLD

**********************   ANY CHANGES NECESSARY ?   ************************

      TYPE 6, ESC, '17', '01', 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      TYPE 6, ESC, '19', '03', '1 ... TO CHANGE HAZARD CODE H'
      TYPE 6, ESC, '20', '03', '2 ... TO CHANGE HAZARD CODE F'
      TYPE 6, ESC, '21', '03', '3 ... TO CHANGE HAZARD CODE R'
      TYPE 6, ESC, '22', '03', '4 ... TO CHANGE SPECIAL HAZARD CODE'
      TYPE 6, ESC, '23', '03', '5 ... TO CHANGE ANY OF THE USER CODES'
      TYPE 7, ESC, '24', '03', '6 ... TO CONTINUE', ESC, '17', '44'

      CALL NORMAL

510   TYPE 5, ESC, '17', '44', ESC, ESC, '17', '44'

      ACCEPT 27, ANSWER

      GO TO (550, 600, 650, 700, 750, 800), ANSWER

550   TYPE 8, ESC, '08', '08', ESC, ESC, '08', '08', '_'
      TYPE 1, ESC, '08', '08'
      ACCEPT 16, NEW_H
      IF (NEW_H .NE. ' ') THEN
        H = NEW_H
      ELSE
        TYPE 6, ESC, '08', '08', H
      ENDIF
      TYPE 11, ESC, '08', '09', ESC
      GOTO 510

600   TYPE 8, ESC, '09', '08', ESC, ESC, '09', '08', '_'
      TYPE 1, ESC, '09', '08'
      ACCEPT 16, NEW_F
      IF (NEW_F .NE. ' ') THEN
        F = NEW_F
      ELSE
        TYPE 6, ESC, '09', '08', F
      ENDIF
      TYPE 11, ESC, '09', '09', ESC
      GOTO 510

650   TYPE 8, ESC, '10', '08', ESC, ESC, '10', '08', '_'
      TYPE 1, ESC, '10', '08'
      ACCEPT 16, NEW_R
      IF (NEW_R .NE. ' ') THEN
        R = NEW_R
      ELSE
        TYPE 6, ESC, '10', '08', R
      ENDIF
      TYPE 11, ESC, '10', '09', ESC
      GOTO 510

700   TYPE 8, ESC, '07', '59', ESC, ESC, '07', '59', '____'
```

```
      TYPE 1, ESC, '07', '59'
      ACCEPT 17, NEW_SH
      IF (NEW_SH .NE. ' ') THEN
        SH = NEW_SH
      ELSE
        TYPE 6, ESC, '07', '59', SH
      ENDIF
      TYPE 11, ESC, '07', '63', ESC
      GOTO 510

750   TYPE 18, ESC, '17', '01', ESC

      CALL BOLD

      TYPE 20, ESC, '17', '01', 'TO CHANGE A USER CODE, SIMPLY ',
     1   'PRESS ''RETURN'' UNTIL YOU REACH'
      TYPE 21, '  THE CODE YOU WISH TO CHANGE, AND THEN PUT IN',
     1   ' THE CORRECT CODE.'

      CALL NORMAL

      TYPE 11, ESC, '13', '05', ESC

      DO 765 I=0,(N_USERS/6)
        DO 755 J=1,5

        K = (I*5) + J
        L = (J*7) - 2
        Y = CHAR (L/10 + 48)
        Z = CHAR (L - 10*(L/10) + 48)
        TYPE 24, ESC, '13', Y, Z, USERS(K), '    '

755     CONTINUE

        DO 760 J=1,5

        K = (I*5) + J
        IF (K .GT. N_USERS) GOTO 508
        L = (J*7) - 2
        Y = CHAR (L/10 + 48)
        Z = CHAR (L - 10*(L/10) + 48)
        TYPE 32, ESC, '13', Y, Z, '____', ESC, '04'

        ACCEPT 17, NEW_US
        IF (NEW_US .NE. ' ') THEN
           USERS(K) = NEW_US
           L = L + 4
           Y = CHAR (L/10 + 48)
           Z = CHAR (L - 10*(L/10) + 48)
           TYPE 24, ESC, '13', Y, Z, '    ', USERS(K+1)
        ELSE
           TYPE 23, ESC, '13', Y, Z, USERS(K)
        ENDIF

760     CONTINUE

765   CONTINUE

      GOTO 508

800   TYPE 18, ESC, '06', '01', ESC

      CALL BOLD
```

```
      ASSIGN 803 TO IRETN

      TYPE 6, ESC, '07', '01', 'INGREDIENTS :'

******************   INGREDIENT INPUT INSTRUCTIONS   ********************

      TYPE 3, ESC, '19', '01', DASHES, DASHES
 802  TYPE 20, ESC, '21', '03', 'IF THERE ARE NO INGREDIENTS, ENTER',
     1       ' ''NK'''
      TYPE 20, ESC, '22', '03', 'PRESS ''RETURN'' AFTER EACH ',
     1       'INGREDIENT'
      TYPE 20, ESC, '23', '03', 'WHEN ALL INGREDIENTS HAVE BEEN ',
     1       'ENTERED, PRESS ''RETURN'''

      GOTO IRETN

 803  DO 805 I=1,10

        L = I + 7

        Y = CHAR (L/10 + 48)
        Z = CHAR (L - 10*(L/10) + 48)

        TYPE 28, ESC, Y, Z, '05', DASHES

 805  CONTINUE

      CALL NORMAL

      DO 810 I=1,10

        L = I + 7

        Y = CHAR (L/10 + 48)
        Z = CHAR (L - 10*(L/10) + 48)

        TYPE 29, ESC, Y, Z, '05'

 808    ACCEPT 30, INGRED(I)

        TYPE 31, ESC, Y, Z, '55', ESC

        IF (INGRED(I) .EQ. ' ') THEN
           CALL BOLD
           TYPE 18, ESC, '21', '01', ESC

*****  VERIFY THEY WANTED TO HIT RETURN

           TYPE 20, ESC, '21', '01', 'ARE YOU FINISHED ENTERING ',
     1           'INGREDIENTS ?  (Y/N)  '
           CALL NORMAL
           TYPE 1, ESC, '21', '49'
           ACCEPT 16, YN
           TYPE 18, ESC, '21', '01', ESC
           IF (YN .EQ. 'Y') GOTO 815
           CALL BOLD
           ASSIGN 809 TO IRETN

*****  WRITE OUT INSTRUCTIONS FOR INGREDIENT INPUT AGAIN

           GOTO 802
 809       CALL NORMAL
```

```
            TYPE 29, ESC, Y, Z, '05'
            GOTO 808
          ENDIF

  810   CONTINUE

  815   N_INGRED = I - 1

  817   TYPE 18, ESC, '21', '01', ESC

        CALL BOLD

*********************   ANY CHANGES NECESSARY ?   ************************

        TYPE 6, ESC, '21', '01', 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
        TYPE 6, ESC, '23', '03', '1 ... TO CHANGE ANY OF THE INGREDIENTS'
        TYPE 7, ESC, '24', '03', '2 ... TO CONTINUE', ESC, '21', '44'

        CALL NORMAL

  820   TYPE 5, ESC, '21', '44', ESC, ESC, '21', '44'

        ACCEPT 27, ANSWER

        GO TO (850, 900), ANSWER

  850   TYPE 18, ESC, '21', '01', ESC

        CALL BOLD

        TYPE 20, ESC, '21', '01', 'TO CHANGE AN INGREDIENT, SIMPLY ',
       1   'PRESS ''RETURN'' UNTIL YOU REACH'
        TYPE 21, '  THE ONE YOU WISH TO CHANGE, AND THEN PUT IN',
       1   ' THE CORRECT INGREDIENT.'

        CALL NORMAL

        DO 855 I=1,N_INGRED

          L = I + 7
          Y = CHAR (L/10 + 48)
          Z = CHAR (L - 10*(L/10) + 48)

          TYPE 28, ESC, Y, Z, '05', DASHES
          TYPE 29, ESC, Y, Z, '05'
          ACCEPT 30, NEW_ID
          IF (NEW_ID .NE. ' ') THEN
             TYPE 31, ESC, Y, Z, '55', ESC
             INGRED(I) = NEW_ID
          ELSE
             TYPE 28, ESC, Y, Z, '05', INGRED(I)
          ENDIF

  855   CONTINUE

        GOTO 817

  900   TYPE 18, ESC, '06', '01', ESC

        CALL BOLD

        TYPE 6, ESC, '07', '01', 'PROTECTIVE DEVICES :'
        TYPE 3, ESC, '17', '01', DASHES, DASHES
```

```
      ASSIGN 903 TO IRETN

***************  PROTECTIVE DEVICE INPUT INSTRUCTIONS   ****************

 902  TYPE 20, ESC, '19', '03', 'IF THERE ARE NO PROTECTIVE DEVICES, ',
     1       'ENTER ''NK'''
      TYPE 6, ESC, '20', '03', 'PRESS ''RETURN'' AFTER EACH DEVICE'
      TYPE 20, ESC, '21', '03', 'WHEN ALL PROTECTIVE DEVICES HAVE ',
     1        'BEEN ENTERED, PRESS ''RETURN'''

      GOTO IRETN

 903  DO 905 I=1,7

        L = I + 8

        Y = CHAR (L/10 + 48)
        Z = CHAR (L - 10*(L/10) + 48)

        TYPE 33, ESC, Y, Z, '05', DASHES

 905  CONTINUE

      CALL NORMAL

      DO 910 I=1,7

        L = I + 8

        Y = CHAR (L/10 + 48)
        Z = CHAR (L - 10*(L/10) + 48)

        TYPE 29, ESC, Y, Z, '05'

 908    ACCEPT 34, PROTEC(I)

        TYPE 31, ESC, Y, Z, '20', ESC

        IF (PROTEC(I) .EQ. ' ') THEN
           CALL BOLD
           TYPE 18, ESC, '19', '01', ESC

*****  VERIFY THEY WANTED TO HIT RETURN

           TYPE 20, ESC, '19', '01', 'ARE YOU FINISHED ENTERING ',
     1           'PROTECTIVE DEVICES ?  (Y/N)  '
           CALL NORMAL
           TYPE 1, ESC, '19', '57'
           ACCEPT 16, YN
           TYPE 18, ESC, '19', '01', ESC
           IF (YN .EQ. 'Y') GOTO 915
           CALL BOLD
           ASSIGN 909 TO IRETN

*****  WRITE OUT INSTRUCTIONS FOR PROT. DEVICE INPUT AGAIN

           GOTO 902
 909       CALL NORMAL
           TYPE 29, ESC, Y, Z, '05'
           GOTO 908
        ENDIF
```

```
910   CONTINUE

915   N_PROT = I - 1

917   TYPE 18, ESC, '19', '01', ESC

      CALL BOLD

      TYPE 6, ESC, '19', '01', 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      TYPE 20, ESC, '21', '03', '1 ... TO CHANGE ANY OF THE PROTECTIVE',
     1        ' DEVICES'
      TYPE 7, ESC, '22', '03', '2 ... TO CONTINUE', ESC, '19', '44'

      CALL NORMAL

920   TYPE 5, ESC, '19', '44', ESC, ESC, '19', '44'

      ACCEPT 27, ANSWER

      GO TO (950, 1000), ANSWER

950   TYPE 18, ESC, '19', '01', ESC

      CALL BOLD

      TYPE 20, ESC, '19', '01', 'TO CHANGE A PROTECTIVE DEVICE, SIMPLY',
     1    ' PRESS ''RETURN'' UNTIL YOU REACH'
      TYPE 21, '  THE ONE YOU WISH TO CHANGE, AND THEN PUT IN',
     1    ' THE CORRECT DEVICE.'

      CALL NORMAL

      DO 955 I=1,N_PROT

        L = I + 8
        Y = CHAR (L/10 + 48)
        Z = CHAR (L - 10*(L/10) + 48)

        TYPE 33, ESC, Y, Z, '05', DASHES
        TYPE 29, ESC, Y, Z, '05'
        ACCEPT 30, NEW_PD
        IF (NEW_PD .NE. ' ') THEN
           TYPE 31, ESC, Y, Z, '20', ESC
           PROTEC(I) = NEW_PD
        ELSE
           TYPE 33, ESC, Y, Z, '05', PROTEC(I)
        ENDIF

955   CONTINUE

      GOTO 917

1000  TYPE 18, ESC, '05', '01', ESC

      TYPE 6, ESC, '07', '01', 'PLEASE WAIT'

********************   WRITE OUT THE DATA   **************************

      WRITE (UNIT=10) DATA_SH, MANUF, TRADE, STOCK
      WRITE (UNIT=11) DATA_SH, N_USERS, N_INGRED, N_PROT,
     1    YEAR, H, F, R, SH

      DO 1010 I=1,N_USERS
```

```
        WRITE (UNIT=12) (UNIQ_DS + I), DATA_SH, USERS(I)
 1010 CONTINUE

      DO 1020 I=1,N_INGRED
        WRITE (UNIT=14) (UNIQ_DS + I), DATA_SH, INGRED(I)
 1020 CONTINUE

      DO 1030 I=1,N_PROT
        WRITE (UNIT=13) (UNIQ_DS + I), DATA_SH, PROTEC(I)
 1030 CONTINUE

*******************************************************************************

      TYPE 18, ESC, '05', '01', ESC

      CALL BOLD

      TYPE 36, ESC       ! BLINK NEXT LINE

      TYPE 35, ESC, '08', '03', 'THANK YOU FOR ENTERING DATA SHEET # ',
     1       DATA_SH
      CALL NORMAL
      TYPE 6, ESC, '11', '03', 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      TYPE 6, ESC, '13', '05', '1 ... TO ENTER ANOTHER DATA SHEET'
      TYPE 6, ESC, '14', '05', '2 ... TO END THIS ENTRY SESSION'

      CALL NORMAL

      TYPE 1, ESC, '11', '46'

      ACCEPT 27, ANSWER

      GOTO (100, 9999), ANSWER

 9999 CALL CLEAR
      TYPE 1, ESC, '01', '01'

*******************************************************************************

  1    FORMAT (1X,A1,'[',A2,';',A2,'H',$)
  2    FORMAT (1X,A1,'[',A2,';',A2,'H',A,A40)
  3    FORMAT (1X,A1,'[',A2,';',A2,'H',A,A20)
  4    FORMAT (1X,A1,'[',A2,';',A2,'H',3A1,A)
  5    FORMAT (1X,A1,'[',A2,';',A2,'H', A1,'[K', A1,'[',A2,';',A2,'H',$)
  6    FORMAT (1X,A1,'[',A2,';',A2,'H',A,$)
  7    FORMAT (1X,A1,'[',A2,';',A2,'H', A, A1,'[',A2,';',A2,'H',$)
  8    FORMAT (1X,A1,'[',A2,';',A2,'H', A1,'[K', A1,'[',A2,';',A2,'H',A)
  9    FORMAT (1X,A1,'[',A2,';',A2,'H',I4,$)
 10    FORMAT (I4)
 11    FORMAT (1X,A1,'[',A2,';',A2,'H', A1,'[K')
 12    FORMAT (A40)
 13    FORMAT (1X,A1)
 14    FORMAT (A20)
 15    FORMAT (A2)
 16    FORMAT (A1)
 17    FORMAT (A4)
 18    FORMAT (1X,A1,'[',A2,';',A2,'H', A1,'[J')
 19    FORMAT (1X,A)
 20    FORMAT (1X,A1,'[',A2,';',A2,'H',A,A)
 21    FORMAT (1X,A,A)
 22    FORMAT (1X,A1,'[',A2,';',A1,A1,'H',$)
 23    FORMAT (1X,A1,'[',A2,';',A1,A1,'H',A,$)
 24    FORMAT (1X,A1,'[',A2,';',A1,A1,'H',A,A,$)
```

```
 25    FORMAT (1X,A1,'[',A2,';',A2,'H',A1,'[K',A1,'[',A2,';',A2,'H',A40)
 26    FORMAT (1X,A1,'[',A2,';',A2,'H',A1,'[K',A1,'[',A2,';',A2,'H',A20)
 27    FORMAT (I1)
 28    FORMAT (1X,A1,'[',A1,A1,';',A2,'H',A,$)
 29    FORMAT (1X,A1,'[',A1,A1,';',A2,'H',$)
 30    FORMAT (A50)
 31    FORMAT (1X,A1,'[',A1,A1,';',A2,'H', A1,'[K')
 32    FORMAT (1X,A1,'[',A2,';',A1,A1,'H',A,A1,'[',A2,'D'$)
 33    FORMAT (1X,A1,'[',A1,A1,';',A2,'H',A15,$)
 34    FORMAT (A15)
 35    FORMAT (1X,A1,'[',A2,';',A2,'H',A,16)
 36    FORMAT (1X,A1,'[5m')

*************************************************************************

       END
```

```
      CHARACTER*40  MANUF, TRADE, NEW_MAN, NEW_TRD
      CHARACTER*20  STOCK, NEW_STK
      CHARACTER*2   YR, NEW_YR
      CHARACTER     H, F, R, YN, NEW_H, NEW_F, NEW_R
      CHARACTER*4   SH, USERS(99), NEW_SH, NEW_US
      CHARACTER*15  PROTEC(7), NEW_PR
      CHARACTER*50  INGRED(10), NEW_IN

      INTEGER*4  DATA_SH, UNIQ_DS, NEW_DS, CHECK_DS
      INTEGER*2  N_USERS, N_PROT, N_INGRED
      INTEGER    ANSWER


      OPEN (UNIT=10, FILE='[BOESSMANN.MATSAFETY]MANUFAC.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=26,
     3     KEY=(1:4:INTEGER, 5:44:CHARACTER, 45:84:CHARACTER,
     4     85:104:CHARACTER), IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=11, FILE='[BOESSMANN.MATSAFETY]HCODES.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=5,
     3     KEY=(1:4:INTEGER, 5:6:INTEGER, 7:8:INTEGER, 9:10:INTEGER,
     4     11:12:CHARACTER, 13:13:CHARACTER, 14:14:CHARACTER,
     5     15:15:CHARACTER, 16:19:CHARACTER), IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=12, FILE='[BOESSMANN.MATSAFETY]USERS.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=3,
     3     KEY=(1:4:INTEGER, 5:8:INTEGER, 9:12:CHARACTER),
     4     IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=13, FILE='[BOESSMANN.MATSAFETY]PROTECT.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=6,
     3     KEY=(1:4:INTEGER, 5:8:INTEGER, 9:23:CHARACTER),
     4     IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=14, FILE='[BOESSMANN.MATSAFETY]INGRED.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=15,
     3     KEY=(1:4:INTEGER, 5:8:INTEGER, 9:58:CHARACTER),
     4     IOSTAT=IOS, ERR=9000)


100   TYPE 800, ' '
      TYPE 800, 'ENTER DATA SHEET NUMBER'
      TYPE 800, '-- THIS NUMBER MUST BE UNIQUE'
      ACCEPT 700, DATA_SH

      TYPE 800, ' '
      TYPE 800, 'ENTER THE NAME OF THE MANUFACTURER'
      TYPE 800, '-- A MAXIMUM OF 40 CHARACTERS IS ALLOWED'
      ACCEPT 701, MANUF

      TYPE 800, ' '
      TYPE 800, 'ENTER THE TRADE NAME'
      TYPE 800, '-- A MAXIMUM OF 40 CHARACTERS IS ALLOWED'
      ACCEPT 701, TRADE

      TYPE 800, ' '
      TYPE 800, 'ENTER THE STOCK/MANUFACTURER NUMBER'
      TYPE 800, '-- A MAXIMUM OF 20 CHARACTERS IS ALLOWED'
      ACCEPT 702, STOCK
```

```
      TYPE 800, ' '
      TYPE 800, 'ENTER THE YEAR THE DATA SHEET WAS OBTAINED'
      TYPE 800, '-- 2 CHARACTERS'
      ACCEPT 703, YR

      TYPE 800, ' '
      TYPE 800, 'ENTER HAZARD CODE H -- 1 CHARACTER'
      ACCEPT 704, H

      TYPE 800, ' '
      TYPE 800, 'ENTER HAZARD CODE F -- 1 CHARACTER'
      ACCEPT 704, F

      TYPE 800, ' '
      TYPE 800, 'ENTER HAZARD CODE R -- 1 CHARACTER'
      ACCEPT 704, R

      TYPE 800, ' '
      TYPE 800, 'ENTER ANY SPECIAL HAZARD CODE -- 4 CHARACTERS ALLOWED'
      ACCEPT 705, SH

125   TYPE 800, ' '
      TYPE 800, 'AT PRESENT, THE DATA IS :'
      TYPE 804, 'DATA SHEET NUMBER : ', DATA_SH
      TYPE 805, 'MANUFACTURER : ', MANUF
      TYPE 805, 'TRADE NAME : ', TRADE
      TYPE 805, 'STOCK/MANUF CODE : ', STOCK
      TYPE 805, 'YEAR DATA SHEET OBTAINED : ', YR
      TYPE 805, 'HAZARD CODE H : ', H
      TYPE 805, 'HAZARD CODE F : ', F
      TYPE 805, 'HAZARD CODE R : ', R
      TYPE 805, 'SPECIAL HAZARD CODE : ', SH
      TYPE 800, ' '
      TYPE 800, 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      TYPE 800, '  1 ... TO CHANGE DATA SHEET NUMBER'
      TYPE 800, '  2 ... TO CHANGE MANUFACTURER'
      TYPE 800, '  3 ... TO CHANGE TRADE NAME'
      TYPE 800, '  4 ... TO CHANGE STOCK/MANUF CODE'
      TYPE 800, '  5 ... TO CHANGE YEAR DATA SHEET OBTAINED'
      TYPE 800, '  6 ... TO CHANGE HAZARD CODE H'
      TYPE 800, '  7 ... TO CHANGE HAZARD CODE F'
      TYPE 800, '  8 ... TO CHANGE HAZARD CODE R'
      TYPE 800, '  9 ... TO CHANGE THE SPECIAL HAZARD CODE'
      TYPE 800, ' 10 ... TO CONTINUE'

      ACCEPT 706, ANSWER

      GOTO (150, 175, 200, 225, 250, 275, 300, 325, 350, 375), ANSWER

150   TYPE 801, 'THE DATA SHEET NUMBER IS PRESENTLY ', DATA_SH
      TYPE 800, 'PLEASE ENTER THE NEW DATA SHEET NUMBER'
      ACCEPT 700, NEW_DS
      IF (NEW_DS .NE. 0) THEN
        DATA_SH = NEW_DS
        TYPE 801, 'THE DATA SHEET NUMBER IS NOW ', DATA_SH
      ELSE
        TYPE 801, 'THE DATA SHEET NUMBER IS STILL ', DATA_SH
      ENDIF
      GOTO 125


175   TYPE 802, 'THE MANUFACTURER IS PRESENTLY ', MANUF
```

```
      TYPE 800, 'PLEASE ENTER THE NEW MANUFACTURER'
      ACCEPT 701, NEW_MAN
      IF (NEW_MAN .NE. ' ') THEN
        MANUF = NEW_MAN
        TYPE 802, 'THE MANUFACUTER IS NOW ', MANUF
      ELSE
        TYPE 802, 'THE MANUFACUTER IS STILL ', MANUF
      ENDIF
      GOTO 125


  200 TYPE 802, 'THE TRADE NAME IS PRESENTLY ', TRADE
      TYPE 800, 'PLEASE ENTER THE NEW TRADE NAME'
      ACCEPT 701, NEW_TRD
      IF (NEW_TRD .NE. ' ') THEN
        TRADE = NEW_TRD
        TYPE 802, 'THE TRADE NAME IS NOW ', TRADE
      ELSE
        TYPE 802, 'THE TRADE NAME IS STILL ', TRADE
      ENDIF
      GOTO 125


  225 TYPE 802, 'THE STOCK/MANUF CODE IS PRESENTLY ', STOCK
      TYPE 800, 'PLEASE ENTER THE NEW STOCK/MANUF CODE'
      ACCEPT 702, NEW_STK
      IF (NEW_STK .NE. ' ') THEN
        STOCK = NEW_STK
        TYPE 802, 'THE STOCK/MANUF CODE IS NOW ', STOCK
      ELSE
        TYPE 802, 'THE STOCK/MANUF CODE IS STILL ', STOCK
      ENDIF
      GOTO 125


  250 TYPE 802, 'THE YEAR IS PRESENTLY ', YR
      TYPE 800, 'PLEASE ENTER THE NEW YEAR'
      ACCEPT 703, NEW_YR
      IF (NEW_YR .NE. ' ') THEN
        YR = NEW_YR
        TYPE 802, 'THE YEAR IS NOW ', YR
      ELSE
        TYPE 802, 'THE YEAR IS STILL ', YR
      ENDIF
      GOTO 125


  275 TYPE 802, 'HAZARD CODE H IS PRESENTLY ', H
      TYPE 800, 'PLEASE ENTER THE NEW HAZARD CODE H'
      ACCEPT 704, NEW_H
      IF (NEW_H .NE. ' ') THEN
        H = NEW_H
        TYPE 802, 'HAZARD CODE H IS NOW ', H
      ELSE
        TYPE 802, 'HAZARD CODE H IS STILL ', H
      ENDIF
      GOTO 125


  300 TYPE 802, 'HAZARD CODE F IS PRESENTLY ', F
      TYPE 800, 'PLEASE ENTER THE NEW HAZARD CODE F'
      ACCEPT 704, NEW_F
      IF (NEW_F .NE. ' ') THEN
```

```
        F = NEW_F
        TYPE 802, 'HAZARD CODE F IS NOW ', F
      ELSE
        TYPE 802, 'HAZARD CODE F IS STILL ', F
      ENDIF
      GOTO 125


325   TYPE 802, 'HAZARD CODE R IS PRESENTLY ', R
      TYPE 800, 'PLEASE ENTER THE NEW HAZARD CODE R'
      ACCEPT 704, NEW_R
      IF (NEW_R .NE. ' ') THEN
        R = NEW_R
        TYPE 802, 'HAZARD CODE R IS NOW ', R
      ELSE
        TYPE 802, 'HAZARD CODE R IS STILL ', R
      ENDIF
      GOTO 125


350   TYPE 802, 'THE SPECIAL HAZARD CODE IS PRESENTLY ', SH
      TYPE 800, 'PLEASE ENTER THE NEW SPECIAL HAZARD CODE'
      ACCEPT 705, NEW_SH
      IF (NEW_SH .NE. ' ') THEN
        SH = NEW_SH
        TYPE 802, 'THE SPECIAL HAZARD CODE IS NOW ', SH
      ELSE
        TYPE 802, 'THE SPECIAL HAZARD CODE IS STILL ', SH
      ENDIF
      GOTO 125


375   TYPE 800, ' '
      TYPE 800, 'USER CODES : MAXIMUM OF 4 CHARACTERS;'
      TYPE 800, '  AT LEAST ONE CODE MUST BE ENTERED --'
      TYPE 800, '  IF THERE IS NONE, ENTER ''NK'''
      TYPE 800, '  PRESS ''RETURN'' AFTER ALL CODES HAVE BEEN ENTERED'
      DO 380 I=1,99
        ACCEPT 705, USERS(I)
        N_USERS = I - 1
        IF (USERS(I) .EQ. ' ') GOTO 381
380   CONTINUE


381   TYPE 800, ' '
      TYPE 800, 'THE USER CODES AT PRESENT ARE :'
      TYPE 806, (USERS(I), I=1,N_USERS)

      TYPE 800, ' '
      TYPE 800, 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      TYPE 800, '  1 ... TO CHANGE ANY OF THE USER CODES'
      TYPE 800, '  2 ... TO CONTINUE'

      ACCEPT 709, ANSWER

      GOTO (400, 425), ANSWER

400   DO 405 I=1,N_USERS

        TYPE 803, 'USER CODE # ',I, ' IS PRESENTLY ', USERS(I)
        TYPE 800, 'DO YOU WISH TO CORRECT THIS ? (Y/N)'
        ACCEPT 704, YN
        IF (YN .EQ. 'N') GOTO 405
```

```
        TYPE 800, 'PLEASE ENTER THE NEW USER CODE'
        ACCEPT 705, NEW_US
        IF (NEW_US .NE. ' ') THEN
          USERS(I) = NEW_US
          TYPE 803, 'USER CODE # ',I, ' IS NOW ', USERS(I)
        ELSE
          TYPE 803, 'USER CODE # ',I, ' IS STILL ', USERS(I)
        ENDIF
        TYPE 800, 'ARE THERE ANY OTHER CHANGES TO USER CODES ? (Y/N)'
        ACCEPT 704, YN
        IF (YN .EQ. 'N') GOTO 381

405   CONTINUE
      GOTO 381


425   TYPE 800, ' '
      TYPE 800, 'INGREDIENTS : MAXIMUM OF 50 CHARACTERS EACH'
      TYPE 802, '  PRESS ''RETURN'' AFTER ALL INGREDIENTS HAVE BEEN',
     1    ' ENTERED'
      DO 430 I=1,10
        ACCEPT 707, INGRED(I)
        N_INGRED = I - 1
        IF (INGRED(I) .EQ. ' ') GOTO 431
430   CONTINUE

431   TYPE 800, ' '
      TYPE 800, 'THE INGREDIENTS AT PRESENT ARE :'
      TYPE 800, (INGRED(I), I=1,N_INGRED)

      TYPE 800, ' '
      TYPE 800, 'PLEASE ENTER ONE OF THE FOLLOWING CODES :'
      TYPE 800, '  1 ... TO CHANGE ANY OF THE INGREDIENTS'
      TYPE 800, '  2 ... TO CONTINUE'

      ACCEPT 706, ANSWER

      GOTO (450, 475), ANSWER

450   DO 455 I=1,N_INGRED

        TYPE 803, 'INGREDIENT # ',I, ' IS PRESENTLY ', INGRED(I)
        TYPE 800, 'DO YOU WISH TO CORRECT THIS ? (Y/N)'
        ACCEPT 704, YN
        IF (YN .EQ. 'N') GOTO 455
        TYPE 800, 'PLEASE ENTER THE NEW INGREDIENT'
        ACCEPT 707, NEW_IN
        IF (NEW_IN .NE. ' ') THEN
          INGRED(I) = NEW_IN
          TYPE 803, 'INGREDIENT # ',I, ' IS NOW ', INGRED(I)
        ELSE
          TYPE 803, 'INGREDIENT # ',I, ' IS STILL ', INGRED(I)
        ENDIF
        TYPE 800, 'ARE THERE ANY OTHER CHANGES TO INGREDIENTS ? (Y/N)'
        ACCEPT 704, YN
        IF (YN .EQ. 'N') GOTO 431

455   CONTINUE
      GOTO 431


475   TYPE 800, ' '
      TYPE 800, 'PROTECTIVE DEVICES : MAXIMUM OF 15 CHARACTERS EACH'
```

```
      TYPE 802, '  PRESS ''RETURN'' AFTER ALL PR. DEVICES HAVE BEEN',
     1    ' ENTERED'
      DO 480 I=1,7
        ACCEPT 708, PROTEC(I)
        N_PROT = I - 1
        IF (PROTEC(I) .EQ. ' ') GOTO 481
480   CONTINUE

481   TYPE 800, ' '
      TYPE 800, 'THE PROTECTIVE DEVICES AT PRESENT ARE :'
      TYPE 800, (PROTEC(I), I=1,N_PROT)

      TYPE 800, ' '
      TYPE 800, 'PLEASE ENTER ONE OF THE FOLLOWING CODES :'
      TYPE 800, '  1 ... TO CHANGE ANY OF THE PROTECTIVE DEVICES'
      TYPE 800, '  2 ... TO CONTINUE'

      ACCEPT 709, ANSWER

      GOTO (500, 525), ANSWER

500   DO 505 I=1,N_PROT

        TYPE 803, 'PR. DEVICE # ',I, ' IS PRESENTLY ', PROTEC(I)
        TYPE 800, 'DO YOU WISH TO CORRECT THIS ? (Y/N)'
        ACCEPT 704, YN
        IF (YN .EQ. 'N') GOTO 505
        TYPE 800, 'PLEASE ENTER THE NEW PR. DEVICE'
        ACCEPT 708, NEW_PR
        IF (NEW_PR .NE. ' ') THEN
          PROTEC(I) = NEW_PR
          TYPE 803, 'PR. DEVICE # ',I, ' IS NOW ', PROTEC(I)
        ELSE
          TYPE 803, 'PR. DEVICE # ',I, ' IS STILL ', PROTEC(I)
        ENDIF
        TYPE 800, 'ARE THERE ANY OTHER CHANGES TO PR. DEVICES ? (Y/N)'
        ACCEPT 704, YN
        IF (YN .EQ. 'N') GOTO 481

505   CONTINUE
      GOTO 481


525   READ (UNIT=10, KEY=DATA_SH, KEYID=0, ERR=600) CHECK_DS

      TYPE 800, ' '
      TYPE 800, 'THE DATA SHEET NUMBER YOU HAVE ENTERED HAS ALREADY'
      TYPE 800, 'BEEN USED; IT MUST BE UNIQUE.'
      TYPE 800, ' '
      TYPE 800, 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      TYPE 800, '  1 ... TO CORRECT THE DATA SHEET NUMBER'
      TYPE 800, '  2 ... TO ENTER A DIFFERENT DATA SHEET'
      TYPE 800, '  3 ... TO END THIS ENTRY SESSION COMPLETELY'

      ACCEPT 709, ANSWER

      GOTO (550, 100, 9100), ANSWER

550   TYPE 800, ' '
      TYPE 800, 'PLEASE ENTER THE NEW DATA SHEET NUMBER'
      ACCEPT 700, NEW_DS
      IF (NEW_DS .NE. 0) THEN
        DATA_SH = NEW_DS
```

```
        TYPE 801, 'THE DATA SHEET NUMBER IS NOW ', DATA_SH
      ELSE
        TYPE 801, 'THE DATA SHEET NUMBER IS STILL ', DATA_SH
      ENDIF
      GOTO 525


600   TYPE 800, ' '
      TYPE 800, 'DO YOU WISH TO ENTER ANOTHER DATA SHEET ? (Y/N)'
      ACCEPT 704, YN
      IF (YN .EQ. 'Y') GOTO 100
      GOTO 9100

9000  TYPE 800,'ERROR IN OPEN STATEMENT'

9100  CLOSE (10)
      CLOSE (11)
      CLOSE (12)
      CLOSE (13)
      CLOSE (14)

700   FORMAT (I6)
701   FORMAT (A40)
702   FORMAT (A20)
703   FORMAT (A2)
704   FORMAT (A1)
705   FORMAT (A4)
706   FORMAT (I2)
707   FORMAT (A50)
708   FORMAT (A15)
709   FORMAT (I1)
800   FORMAT (1X,A)
801   FORMAT (1X,A,I6)
802   FORMAT (1X,A,A)
803   FORMAT (1X,A,I2,A,A)
804   FORMAT (3X,A,I6)
805   FORMAT (3X,A,A)
806   FORMAT (1X,8(A4,4X))

      END
```

```
************************************************************************
*                                                                      *
* PROGRAM TITLE :       PRINTDATA                                      *
*                                                                      *
* WRITTEN BY :          DIETER BOESSMANN                               *
*                       COMPUTER APPLICATIONS                          *
*                       NSMRL                                          *
*                                                                      *
* PROGRAM INTENT :      THIS PROGRAM ALLOWS THE USER TO OBTAIN A       *
*                       LISTING OF THE MATERIAL SAFETY DATA PRESENTLY  *
*                       STORED.  THE LISTING CAN BE THE ENTIRE DATA    *
*                       BASE, OR JUST A SUBSET OF IT.                  *
*                                                                      *
************************************************************************

      CHARACTER*50 INGRED(10)
      CHARACTER*40 MANUF, TRADE
      CHARACTER*20 STOCK
      CHARACTER*15 PROTEC(7)
      CHARACTER*4  SH, USERS(99)
      CHARACTER*2  YR
      CHARACTER    H, F, R

      INTEGER*4    DATA_SH, UNIQ_DS, BEG_DS, END_DS
      INTEGER*2    N_USERS, N_INGRED, N_PROT

      OPEN (UNIT=10, FILE='[BOESSMANN.MATSAFETY]MANUFAC.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=26,
     3     KEY=(1:4:INTEGER, 5:44:CHARACTER, 45:84:CHARACTER,
     4     85:104:CHARACTER), IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=11, FILE='[BOESSMANN.MATSAFETY]HCODES.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=5,
     3     KEY=(1:4:INTEGER, 5:6:INTEGER, 7:8:INTEGER, 9:10:INTEGER,
     4     11:12:CHARACTER, 13:13:CHARACTER, 14:14:CHARACTER,
     5     15:15:CHARACTER, 16:19:CHARACTER), IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=12, FILE='[BOESSMANN.MATSAFETY]USERS.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=3,
     3     KEY=(1:4:INTEGER, 5:8:INTEGER, 9:12:CHARACTER),
     4     IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=13, FILE='[BOESSMANN.MATSAFETY]PROTECT.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=6,
     3     KEY=(1:4:INTEGER, 5:8:INTEGER, 9:23:CHARACTER),
     4     IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=14, FILE='[BOESSMANN.MATSAFETY]INGRED.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=15,
     3     KEY=(1:4:INTEGER, 5:8:INTEGER, 9:58:CHARACTER),
     4     IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=31, FILE='MSDATA.DAT', STATUS='NEW',
     1     DISPOSE='PRINT/DELETE')


      WRITE (31, 804)
      PAGE_LEN = 0
```

```
      TYPE 805
      ACCEPT 705, BEG_DS

      TYPE 806
      ACCEPT 705, END_DS

      READ (10, KEYGE=BEG_DS, KEYID=0, ERR=9100) DATA_SH, MANUF,
     1       TRADE, STOCK

      READ (11, KEYGE=BEG_DS, KEYID=0, ERR=9100) DATA_SH, N_USERS,
     1       N_INGRED, N_PROT, YR, H, F, R, SH


      READ (12, KEYGE=BEG_DS, KEYID=1, ERR=9100) UNIQ_DS, DATA_SH,
     1       USERS(1)

      DO 100 I=2,N_USERS
        READ (12, ERR=9100) UNIQ_DS, DATA_SH, USERS(I)
100   CONTINUE


      READ (13, KEYGE=BEG_DS, KEYID=1, ERR=9100) UNIQ_DS, DATA_SH,
     1       PROTEC(1)

      DO 200 I=2,N_PROT
        READ (13, ERR=9100) UNIQ_DS, DATA_SH, PROTEC(I)
200   CONTINUE


      READ (14, KEYGE=BEG_DS, KEYID=1, ERR=9100) UNIQ_DS, DATA_SH,
     1       INGRED(1)

      DO 300 I=2,N_INGRED
        READ (14, ERR=9100) UNIQ_DS, DATA_SH, INGRED(I)
300   CONTINUE


      DO WHILE (DATA_SH .LE. END_DS)

        PAGE_LEN = PAGE_LEN + 9 + N_USERS/10 + N_INGRED + N_PROT/5

        IF (PAGE_LEN .GT. 55) THEN
          WRITE (31, 804)
          PAGE_LEN = 9 + N_USERS/10 + N_INGRED + N_PROT/5
        ENDIF

        WRITE (31, 800) DATA_SH, MANUF, TRADE, STOCK, YR, H, F, R, SH
        WRITE (31, 801) (USERS(I), I=1,N_USERS)
        WRITE (31, 802) (INGRED(J), J=1,N_INGRED)
        WRITE (31, 803) (PROTEC(K), K=1,N_PROT)

        READ (10, ERR=9100) DATA_SH, MANUF, TRADE, STOCK

        READ (11, ERR=9100) DATA_SH, N_USERS, N_INGRED, N_PROT,
     1       YR, H, F, R, SH

        DO 400 I=1,N_USERS
          READ (12, ERR=9100) UNIQ_DS, DATA_SH, USERS(I)
400     CONTINUE


        DO 500 I=1,N_PROT
          READ (13, ERR=9100) UNIQ_DS, DATA_SH, PROTEC(I)
```

```
500     CONTINUE

        DO 600 I=1,N_INGRED
          READ (14, ERR=9100) UNIQ_DS, DATA_SH, INGRED(I)
600     CONTINUE


      END DO


      GOTO 9100

9000 PRINT *,'ERROR IN OPEN STATEMENT'

9100   CLOSE (10)
       CLOSE (11)
       CLOSE (12)
       CLOSE (13)
       CLOSE (14)

705    FORMAT (I6)
800    FORMAT (//1X, 'DATA SHEET NUMBER : ',I6/1X,'MANUFACTURER : ',A40,
     1    /1X, 'TRADE NAME    : ',A40/, 1X, 'STOCK/MANUF CODE : ',A20,
     2    '   YEAR DATA SHEET OBTAINED : 19',A2/1X,'HAZARD CODES  H : ',
     3    A1,'     F : ',A1, '     R : ',A1,'      SPECIAL HAZARD CODE : ',
     4    A4)
801    FORMAT (1X, 'USER CODES  : ', 9(A4,3X), 10(/1X,T16,9(A4,3X)))
802    FORMAT (1X, 'INGREDIENTS : ', A50, 9(/1X,T16,A50))
803    FORMAT (1X, 'PR. DEVICES : ', 4(A15,3X) / 1X,T16, 3(A15,3X))
804    FORMAT ('1', T31, 'MATERIAL SAFETY DATA')
805    FORMAT (1X, 'BEGINNING DATA SHEET NUMBER : ',$)
806    FORMAT (1X, 'ENDING DATA SHEET NUMBER : ',$)
       END
```

```
************************************************************************
*                                                                      *
* PROGRAM TITLE :       MATCH                                          *
*                                                                      *
* WRITTEN BY :          DIETER BOESSMANN                               *
*                       COMPUTER APPLICATIONS                          *
*                       NSMRL                                          *
*                                                                      *
* PROGRAM INTENT :      THIS PROGRAM ALLOWS THE USER TO OBTAIN A       *
*                       LISTING OF ALL THE MATERIAL SAFETY DATA        *
*                       CONTAINING A USER-GIVEN STRING OF CHARACTERS   *
*                       IN THE USER-CHOSEN CATEGORY.  FOR EXAMPLE,     *
*                       ONE COULD OBTAIN ALL THE MATERIAL SAFETY       *
*                       DATA SHEETS CONTAINING 'BENZENE' IN ONE OF     *
*                       THE INGREDIENTS BY USING THIS PROGRAM.         *
*                                                                      *
************************************************************************

      CHARACTER*50  INGRED(10), SRCH_STR, SUB_STR
      CHARACTER*40  MANUF, TRADE
      CHARACTER*24  CHOICES(11)
      CHARACTER*20  STOCK
      CHARACTER*15  PROTEC(15)
      CHARACTER*4   SH, USERS(99)
      CHARACTER*2   YR
      CHARACTER     H, F, R

      INTEGER*4     DATA_SH, UNIQ_DS
      INTEGER*2     N_USERS, N_INGRED, N_PROT
      INTEGER       ANSWER, LENGTHS(11), START, PAGE_LEN

************************************************************************

      DATA CHOICES/ 'MANUFACTURER', 'TRADE NAME', 'STOCK/MANUF CODE',
     1    'YEAR DATA SHEET OBTAINED', 'HAZARD CODE H', 'HAZARD CODE F',
     2    'HAZARD CODE R', 'SPECIAL HAZARD CODE', 'USER CODE',
     3    'INGREDIENT', 'PROTECTIVE DEVICE'/

      DATA LENGTHS/ 40, 40, 20, 2, 1, 1, 1, 4, 4, 50, 15/

************************************************************************

      OPEN (UNIT=10, FILE='[BOESSMANN.MATSAFETY]MANUFAC.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=26,
     3     KEY=(1:4:INTEGER, 5:44:CHARACTER, 45:84:CHARACTER,
     4     85:104:CHARACTER), IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=11, FILE='[BOESSMANN.MATSAFETY]HCODES.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=5,
     3     KEY=(1:4:INTEGER, 5:6:INTEGER, 7:8:INTEGER, 9:10:INTEGER,
     4     11:12:CHARACTER, 13:13:CHARACTER, 14:14:CHARACTER,
     5     15:15:CHARACTER, 16:19:CHARACTER), IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=12, FILE='[BOESSMANN.MATSAFETY]USERS.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=3,
     3     KEY=(1:4:INTEGER, 5:8:INTEGER, 9:12:CHARACTER),
     4     IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=13, FILE='[BOESSMANN.MATSAFETY]PROTECT.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=6,
```

```
     3      KEY=(1:4:INTEGER, 5:8:INTEGER, 9:23:CHARACTER),
     4      IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=14, FILE='[BOESSMANN.MATSAFETY]INGRED.DAT',
     1      STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2      RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=15,
     3      KEY=(1:4:INTEGER, 5:8:INTEGER, 9:58:CHARACTER),
     4      IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=31, FILE='MSDATA.DAT', STATUS='NEW',
     1      DISPOSE='PRINT/DELETE')

*****************************************************************************

      PAGE_LEN = 56             ! SET ABOVE MAX PAGE LENGTH LIMIT, SO
*                                 TITLE WILL BE WRITTEN OUT FIRST TIME THRU


      READ (10, KEYGE=0, KEYID=0, ERR=9100) DATA_SH, MANUF,
     1      TRADE, STOCK

      READ (11, KEYGE=0, KEYID=0, ERR=9100) DATA_SH, N_USERS,
     1      N_INGRED, N_PROT, YR, H, F, R, SH

      READ (12, KEYGE=0, KEYID=1, ERR=9100) UNIQ_DS, DATA_SH,
     1      USERS(1)

      DO 100 I=2,N_USERS
        READ (12, ERR=9100) UNIQ_DS, DATA_SH, USERS(I)
100   CONTINUE


      READ (13, KEYGE=0, KEYID=1, ERR=9100) UNIQ_DS, DATA_SH,
     1      PROTEC(1)

      DO 200 I=2,N_PROT
        READ (13, ERR=9100) UNIQ_DS, DATA_SH, PROTEC(I)
200   CONTINUE

      READ (14, KEYGE=0, KEYID=1, ERR=9100) UNIQ_DS, DATA_SH,
     1      INGRED(1)

      DO 300 I=2,N_INGRED
        READ (14, ERR=9100) UNIQ_DS, DATA_SH, INGRED(I)
300   CONTINUE


      TYPE 800, 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      DO 350 I=1,11
        TYPE 801, I, ' ... TO FIND A ', CHOICES(I)
350   CONTINUE

      ACCEPT 900, ANSWER

360   TYPE 800, ' '
      TYPE 809, 'PLEASE ENTER YOUR DESIRED ', CHOICES(ANSWER)

      ACCEPT 901, SUB_STR

      DO 370 I=50,1,-1
        IF (SUB_STR(I:I) .NE. ' ') THEN
          LENG = I
          GOTO 375
```

```
        ENDIF
370   CONTINUE


375   IF (LENG .LE. LENGTHS(ANSWER)) GOTO 400

      TYPE 800, ' '
      TYPE 800, 'THE ANSWER YOU GAVE WAS TOO LONG. THERE IS A'
      TYPE 803, 'MAXIMUM OF ', LENGTHS(ANSWER), ' CHARACTERS ALLOWED'
      TYPE 809, 'FOR ANY ', CHOICES(ANSWER)

      GOTO 360

400   X = 1

      DO WHILE (X .EQ. 1)

        GOTO (425, 450, 475, 500, 525, 550, 575, 600, 625, 650, 675),
     1       ANSWER

425     SRCH_STR = MANUF
        GOTO 700

450     SRCH_STR = TRADE
        GOTO 700

475     SRCH_STR = STOCK
        GOTO 700

500     SRCH_STR = YR
        GOTO 700

525     SRCH_STR = H
        GOTO 700

550     SRCH_STR = F
        GOTO 700

575     SRCH_STR = R
        GOTO 700

600     SRCH_STR = SH
        GOTO 700

625     DO 630 I=1,N_USERS
          SRCH_STR = USERS(I)
          START = INDEX (SRCH_STR, SUB_STR(1:LENG))
          IF (START .NE. 0) GOTO 725
630     CONTINUE
        GOTO 750

650     DO 655 I=1,N_INGRED
          SRCH_STR = INGRED(I)
          START = INDEX (SRCH_STR, SUB_STR(1:LENG))
          IF (START .NE. 0) GOTO 725
655     CONTINUE
        GOTO 750

675     DO 680 I=1,N_PROT
          SRCH_STR = PROTEC(I)
          START = INDEX (SRCH_STR, SUB_STR(1:LENG))
          IF (START .NE. 0) GOTO 725
680     CONTINUE
```

```
        GOTO 750


 700    START = INDEX (SRCH_STR, SUB_STR(1:LENG))
        IF (START .EQ. 0) GOTO 750


 725    PAGE_LEN = PAGE_LEN + 9 + N_USERS/10 + N_INGRED + N_PROT/5

        IF (PAGE_LEN .GT. 55) THEN
          WRITE (31, 804)
          WRITE (31, 810) SUB_STR(1:LENG), CHOICES(ANSWER)
          PAGE_LEN = 9 + N_USERS/10 + N_INGRED + N_PROT/5
        ENDIF

        WRITE (31, 805) DATA_SH, MANUF, TRADE, STOCK, YR, H, F, R, SH
        WRITE (31, 806) (USERS(I), I=1,N_USERS)
        WRITE (31, 807) (INGRED(I), I=1,N_INGRED)
        WRITE (31, 808) (PROTEC(I), I=1,N_PROT)


 750    READ (10, ERR=9100) DATA_SH, MANUF, TRADE, STOCK

        READ (11, ERR=9100) DATA_SH, N_USERS, N_INGRED, N_PROT,
     1       YR, H, F, R, SH

        DO 760 I=1,N_USERS
          READ (12, ERR=9100) UNIQ_DS, DATA_SH, USERS(I)
 760    CONTINUE

        DO 770 I=1,N_INGRED
          READ (14, ERR=9100) UNIQ_DS, DATA_SH, INGRED(I)
 770    CONTINUE

        DO 780 I=1,N_PROT
          READ (13, ERR=9100) UNIQ_DS, DATA_SH, PROTEC(I)
 780    CONTINUE


      END DO


 9000 PRINT *,'ERROR IN OPEN STATEMENT'

 9100 CLOSE (10)
      CLOSE (11)
      CLOSE (12)
      CLOSE (13)
      CLOSE (14)

*******************************************************************************

 800  FORMAT (1X,A)
 801  FORMAT (3X,I2,A,A)
 802  FORMAT (1X,A,A,A)
 803  FORMAT (1X,A,I2,A)
 804  FORMAT ('1', T31, 'MATERIAL SAFETY DATA')
 805  FORMAT (//1X, 'DATA SHEET NUMBER : ',I6//' MANUFACTURER : ', A20,
     1   /' TRADE NAME    : ', A40//' STOCK/MANUF CODE : ', A20,
     2   '    YEAR DATA SHEET OBTAINED : 19', A2//' HAZARD CODES  H : ',
     3   A1,'    F : ', A1,'    R : ', A1,'       SPECIAL HAZARD CODE : ',
     4   A4)
 806  FORMAT (1X, 'USER CODES  : ', 9(A4,3X), 10(/1X,T16,9(A4,3X)))
```

```
 807  FORMAT (1X, 'INGREDIENTS : ', A50, 9(/1X,T16,A50))
 808  FORMAT (1X, 'PR. DEVICES : ', 4(A15,3X) / 1X,T16, 3(A15,3X))
 809  FORMAT (1X,A,A)
 810  FORMAT (1X,T26,'WITH ', A, ' IN THE ', A)

 900  FORMAT (I2)
 901  FORMAT (A50)

*************************************************************************

      END
```

```
************************************************************************
*                                                                      *
* PROGRAM TITLE :       MATERIAL SAFETY SORT                           *
*                                                                      *
* WRITTEN BY :          DIETER BOESSMANN                               *
*                       COMPUTER APPLICATIONS                          *
*                       NSMRL                                          *
*                                                                      *
* PROGRAM INTENT :      THIS PROGRAM ALLOWS THE USER TO OBTAIN         *
*                       A LISTING OF THE MATERIAL SAFETY DATA          *
*                       IN SORTED ORDER, BASED ON THE MANUFACTURER,    *
*                       TRADE NAME OR STOCK/MANUF CODE.                *
*                                                                      *
************************************************************************

      CHARACTER*40 MANUF, TRADE
      CHARACTER*20 STOCK
      CHARACTER*4  SH
      CHARACTER*2  YR
      CHARACTER    H, F, R

      INTEGER*4    DATA_SH
      INTEGER*2    N_USERS, N_INGRED, N_PROT
      INTEGER      ANSWER, COUNT

************************************************************************

      OPEN (UNIT=10, FILE='[BOESSMANN.MATSAFETY]MANUFAC.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=26,
     3     KEY=(1:4:INTEGER, 5:44:CHARACTER, 45:84:CHARACTER,
     4     85:104:CHARACTER), IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=11, FILE='[BOESSMANN.MATSAFETY]HCODES.DAT',
     1     STATUS='OLD', ORGANIZATION='INDEXED', ACCESS='KEYED',
     2     RECORDTYPE='VARIABLE', FORM='UNFORMATTED', RECL=5,
     3     KEY=(1:4:INTEGER, 5:6:INTEGER, 7:8:INTEGER, 9:10:INTEGER,
     4     11:12:CHARACTER, 13:13:CHARACTER, 14:14:CHARACTER,
     5     15:15:CHARACTER, 16:19:CHARACTER), IOSTAT=IOS, ERR=9000)

      OPEN (UNIT=19, FILE='MSDATA.DAT', STATUS='NEW',
     1     DISPOSE='PRINT/DELETE')

************************************************************************

      COUNT = 60

      TYPE 8000, 'PLEASE ENTER ONE OF THE FOLLOWING CODES'
      TYPE 8001, '1 ... TO SORT BY MANUFACTURER'
      TYPE 8001, '2 ... TO SORT BY TRADE NAME'
      TYPE 8001, '3 ... TO SORT BY STOCK/MANUF CODE'

      ACCEPT 7000, ANSWER

      READ (10, KEYGE=' ', KEYID=ANSWER, ERR=9100) DATA_SH, MANUF,
     1     TRADE, STOCK

      READ (11, KEY=DATA_SH, KEYID=0, ERR=9100) DATA_SH, N_USERS,
     1     N_INGRED, N_PROT, YR, H, F, R, SH

  100 IF (COUNT .GT. 58) THEN
        COUNT = 1
        WRITE (19, 8003)
      ENDIF
```

```
      COUNT = COUNT + 1

      WRITE (19, 8002) MANUF, TRADE, STOCK, H, F, R, SH

      READ (10, END=9100) DATA_SH, MANUF, TRADE, STOCK
      READ (11, END=9100) DATA_SH, N_USERS, N_INGRED, N_PROT, YR,
     1      H, F, R, SH

      GOTO 100

*******************************************************************************

 7000 FORMAT (I1)
 8000 FORMAT (1X,A)
 8001 FORMAT (3X,A)
 8002 FORMAT (6X,A,'  ',A,'  ',A,'  ',A,'  ',A,'  ',A,'    ',A)
 8003 FORMAT ('1', 1X, T113, 'HAZARD', T124, 'SP H'/6X, 'MANUFACTURER',
     1    T49,'TRADE NAME', T91, 'STOCK/MANUF CODE', T114, 'CODES', T124,
     2    'CODE'/1X, T113, 'H  F  R'/)

*******************************************************************************

 9000  PRINT *,'ERROR IN OPEN STATEMENT'

 9100  CLOSE (10)
       CLOSE (11)
       CLOSE (12)
       CLOSE (13)
       CLOSE (14)

       END
```

APPENDIX 6

COMPARISON OF INFORMATION CATEGORIES OF (A.) OSHA, (B.) HMIS, AND (C.)VAX/MSDS

The information on an MSDS OSHA form 20 is broken down into 9 separate sections:

1) manufacturer's name, address, phone number, chemical name, and trade name.
2) hazardous ingredients
3) physical data
4) fire and explosion hazard data
5) health hazard data
6) reactivity data
7) spill or leak procedures
8) special protection information
9) special precautions

The HMIS data sheet is broken down into 8 sections:

1) hazardous item indication which includes the federal stock nunmber and trade name.
2) general information which includes manufacturer
3) hazardous components
4) transportation data
5) additional data
6) health and physical property data
7) safety storage and fire fighting procedures
8) spill and leak procedures

VAX/MSDS system uses a core of data which we feel is most germane for generating lists of information by the computer for the identification and protection from chemical hazards.

1) manufacturer
2) trade name
3) stock number
4) date MSDS was obtained
5) hazard code
6) user code (code is shown below)
7) ingredients
8) protective devices

THE VAX/MSDS USER CODE

SERIES	SUB SERIES	DESCRIPTION
0000		RESERVED
1000		NSSF
2000		SUBASE
3000		USS FULTON
4000		NUSC
5000		FORCES AFLOAT
6000		RESERVE CENTERS

7000		MISCELLANEOUS ACTIVITES, CT
	7100	SUBSCHOOL
	7200	SUPSHIP
	7300	NAVSUBMEDRSCHLAB
8000		MISCELLANEOUS ACTIVITIES, NY
	8100	BROOKLYN NAVAL STATION
9000		RESERVED

It should be noted that the user code as well as the other information categories of the VAX/MSDS system are still in the experimental testing stage of development.

MATERIAL SAFETY DATA

DATA SHEET NUMBER : 1
MANUFACTURER : AMALIE REFINING CORPORATION
TRADE NAME : BLACK VELVET GREASE
STOCK/MANUF CODE : CA 1LG — YEAR DATA SHEET OBTAINED : 1979
HAZARD CODES H : 4 F : 1 R : 0 — SPECIAL HAZARD CODE :
USER CODES : NK
INGREDIENTS : CALCIUM STEARATE
LEAD OXIDE
GRAPHITE

PR. DEVICES : NK

DATA SHEET NUMBER : 2
MANUFACTURER : DEXTER CORPORATION
TRADE NAME : AQUADEX TOUCH-UP
STOCK/MANUF CODE : 32246 — YEAR DATA SHEET OBTAINED : 1975
HAZARD CODES H : N F : N R : N — SPECIAL HAZARD CODE : NK
USER CODES : NK
INGREDIENTS : LEAD SULPHATE
LEAD

PR. DEVICES : NK

DATA SHEET NUMBER : 3
MANUFACTURER : AMALIE REFINING COMPANY
TRADE NAME : AQUA-SONIC SHIELD
STOCK/MANUF CODE : NK — YEAR DATA SHEET OBTAINED : 1979
HAZARD CODES H : 2 F : 3 R : 0 — SPECIAL HAZARD CODE : NK
USER CODES : NK
INGREDIENTS : STODDARD SOLVENT
CALCIUM STEARATE

PR. DEVICES : NK

DATA SHEET NUMBER : 4
MANUFACTURER : AMALIE REFINING COMPANY
TRADE NAME : FILMSPRAY RUSTOP
STOCK/MANUF CODE : NK — YEAR DATA SHEET OBTAINED : 1979
HAZARD CODES H : 2 F : 3 R : 0 — SPECIAL HAZARD CODE : NK
USER CODES : NK
INGREDIENTS : STODDARD SOLVENT
CALCIUM SULFONATE
PETROLATUM

PR. DEVICES : NK

MATERIAL SAFETY DATA
WITH BENZENE IN THE INGREDIENT

DATA SHEET NUMBER : 116
MANUFACTURER : HUGHSON CHEMICALS
TRADE NAME : CHEMGLAZE BLUE ELASTOMERIC POLYURETHANE
STOCK/MANUF CODE : TS 3236-25A YEAR DATA SHEET OBTAINED : 1980
HAZARD CODES H : 2 F : 4 R : 0 SPECIAL HAZARD CODE :
USER CODES : NK
INGREDIENTS : ETHYL BENZENE
N-BUTYL ACETATE
TOLUENE DIISOCYANATE
CELLOSOLVE ACETATE
2-ETHOXYETHYLACETATE

PR. DEVICES : NK

DATA SHEET NUMBER : 139
MANUFACTURER : THE CARTER'S INK COM
TRADE NAME : CARTER'S RUBBER CEMENT
STOCK/MANUF CODE : 8040-00-291-8625 YEAR DATA SHEET OBTAINED : 1978
HAZARD CODES H : 3 F : 3 R : 0 SPECIAL HAZARD CODE :
USER CODES : NK
INGREDIENTS : BENZENE

PR. DEVICES : NK

DATA SHEET NUMBER : 155
MANUFACTURER : HUGHSON CHEMICALS
TRADE NAME : CHEMGLAZE GREEN ELASTOMERIC POLYURETHANE
STOCK/MANUF CODE : TS 3236-23A YEAR DATA SHEET OBTAINED : 1980
HAZARD CODES H : 3 F : 2 R : 1 SPECIAL HAZARD CODE :
USER CODES : NK
INGREDIENTS : ETHYL BENZENE
N-BUTYL ACETATE
CELLOSOLVE ACETATE
2-ETHOXYETHYL ACETATE
TOLUENE DIISOCYANATE
CARBON BLACK
LEAD
CHROMATES

PR. DEVICES : NK

DATA SHEET NUMBER : 161
MANUFACTURER : HUGHSON CHEMICALS
TRADE NAME : CHEMGLAZE THINNER 9954
STOCK/MANUF CODE : NK YEAR DATA SHEET OBTAINED : 1980
HAZARD CODES H : 2 F : 4 R : 0 SPECIAL HAZARD CODE :
USER CODES : NK
INGREDIENTS : N-BUTYL ACETATE
ETHYL BENZENE
CELLOSOLVE ACETATE

PR. DEVICES : NK

MANUFACTURER	TRADE NAME	STOCK/MANUF. CODE	HAZARD CODES H	F	R	SP H CODE
3M	FC-780B MIL SPEC TYPE AFF 6% CONCENTRATE	98 0211 0778 8 (5 GA	1	0	0	NK
3M	XL ACTIVATOR	NK	2	1	0	NK
3M	XL CAMERA PLATE DEVELOPER	NK	2	4	1	NK
3M	SCOTCH BRAND 6065 SPRA MOUNT ADHESIVE	62 6065 4825 3	1	3	0	NK
3M COMPANY	BRAND ACTIVATOR	NK	2	3	1	NK
3M COMPANY	FASTBOND 30 CONTACT	NK	1	3	0	NK
3M COMPANY	GLASS BUBBLES	NK	2	4	1	NK
A.B. DICK COMPANY	COPIER DISPERSANT	92-22-85	2	4	1	NK
A.B. DICK COMPANY	OFFSET TONER CONCENTRATE	92 2186	1	3	0	NK
A.B.DICK COMPANY	CONVERSION SOLUTION	4-1067	2	4	1	NK
ADHES ENGINEERING COMPANY	CONCRESIVE 1419-PART A	NK	2	3	1	NK
ADHESIVE ENGINEERING COMPANY	CONCRESIVE 1419-PART B	NK	2	3	0	NK
AEROSPACE AND DEFENSE PRODUCTS DIVISION	HLN 30	NK	1	1	0	NK
ALCOA CONDUCTOR PRODUCTS COMPANY	ELECTRICAL JOINT COMPOUND NUMBER 2	NK	2	3	0	NK
ALFCO INC.	FERTILIZER	ALFCO 48	1	1	0	NK
ALLIED CHEMICAL CORPORATION	KEFONE COMPOUND 1189	NK	1	1	0	NK
ALLIED CHEMICAL CORPORATION SPECIALTY CH	GENESOLV D	6850 00 105 3084	2	3	1	NK
ALLIED CHEMICAL CORPORATION SPECIALTY CH	GENETRON 113 GENESOLV D	MIL C 81302 AND 6850	2	4	1	NK
ALLIED KELITE PRODUCTS	SPRAY WHITE E	NK	2	1	1	NK
ALLIED RESIN CORPORATION	ARCON H-31	NK	2	1	1	NK
ALLIED RESIN CORPORATION	EPOXY RESIN HARDENER	ARCON 315, 325, 340	2	0	1	NK
ALLIED RESIN CORPORATION	ARCON AUTOBODY PASTE	NK	3	2	0	NK
ALLIED RESIN CORPORATION	LIQUID EPOXY RESIN	ARCON 2795	0	1	0	NK
AM CORPORATION MULTIGRAPHICS DIV	BLANKROLA SOLVENT	200-170	N	N	N	NK
AM CORPORATION MULTIGRAPHICS DIV	DEGLAZING SOLVENT	200-788	2	3	0	NK
AM CORPORATION MULTIGRAPHICS DIV	ELECTROSTATIC SOLUTION	200-1050-1055	N	N	N	NK
AM CORPORATION MULTIGRAPHICS DIV	ELECTROSTATIC SOLUTION	200-1050	2	3	1	NK
AM CORPORATION MULTIGRAPHICS DIVISION	BLANKROLA SOLVENT	83-1-77004	2	3	1	NK
AM CORPORATION MULTIGRAPHICS DIVISION	DEGLAZING SOLVENT	83 7 788001	2	3	1	NK
AM CORPORATION MULTIGRAPHICS DIVISION	REPELEX CONCENTRATE	200 722 2A, 4A, 5A	1	1	0	NK
AMALIE REFINING COMPANY	AQUA-SONIC SHIELD	NK	2	1	0	NK
AMALIE REFINING COMPANY	FILMSPRAY RUSTOP	NK	2	1	0	NK
AMALIE REFINING COMPANY	AMALIE VISCOUS CHASSIS GREASE	NK	4	1	0	NK
AMALIE REFINING COMPANY	AMALIE FRIGI-TREAT	NK	1	1	0	NK
AMALIE REFINING COMPANY	AMALIE HYDRAULIC OIL	EC-199 R-165	1	1	0	NK
AMALIE REFINING COMPANY	AMALIE OUTBOARD GEAR OIL	NK	2	2	0	NK
AMALIE REFINING COMPANY	AMALIE AUTOMATIC TRANSMISSION FLUID TYPE	NK	3	0	0	NK
AMALIE REFINING COMPANY	AMALIE ALL CLIMATE 150 HYDRAULIC FLUID	NK	1	0	0	NK
AMALIE REFINING COMPANY	AMALIE LOW TEMPERATURE HYDRAULIC FLUID	NK	2	3	0	NK
AMALIE REFINING COMPANY	AMALIE R&O HYDRAULIC FLUIDS 32AW & 68AW	NK	2	3	2	NK
AMALIE REFINING COMPANY	ALL TRAC HYDRAULIC FLUID 245	NK	2	3	1	NK
AMALIE REFINING COMPANY	TWO-CYCLE MOTOR OIL	NK	2	3	1	NK
AMALIE REFINING COMPANY	AMALIE NON-DETERGENT MOTOR OIL	NK	2	1	1	NK
AMALIE REFINING COMPANY	AMALIE PRO HIGH PERFORMANCE MOTER OIL	NK	1	2	0	NK
AMALIE REFINING COMPANY	AMALIE MULTI-PURPOSE GEAR LUBRICANT	NK	4	0	2	NK
AMALIE REFINING COMPANY	AMALIE MULTI-PURPOSE GEAR LUBRICANT LS S	NK	4	3	1	NK
AMALIE REFINING COMPANY	AMALIE TRI-VIS MULTI-PURPOSE GEAR LUBRIC	NK	2	3	0	NK
AMALIE REFINING COMPANY	AMALIE VW/PORSCHE-AUDI GEAR LUBRICANT SA	NK	1	0	0	NK
AMALIE REFINING COMPANY	AMALIE STRAIGHT MINERAL GEAR LUBRICANT S	NK	1	0	0	NK
AMALIE REFINING COMPANY	AMALIE 800 MANUAL TRANSMISSION LUBE	NK	1	2	0	NK
AMALIE REFINING COMPANY	AUTOMATIC TRANSMISSION FLUID DEXRON-II	NK	2	1	2	NK
AMALIE REFINING COMPANY	OUTBOARD MOTOR OIL	NK	2	1	2	NK
AMALIE REFINING COMPANY	BAR AND CHAIN OIL SAE 30	NK	2	1	2	NK
AMALIE REFINING COMPANY	AMA-OIL R&O AW 200, 300, 500, 800	NK	1	2	0	NK
AMALIE REFINING COMPANY	AMALIE XLO MOTOR OIL ALL SAE GRADES	NK	4	1	0	NK
AMALIE REFINING COMPANY	AMALIE IMPERIAL ALL SEASONS MOTOR OIL, A	NK	1	1	2	NK
AMALIE REFINING COMPANY	AMALIE HEAVY DUTY MOTOR OIL, ALL SAE GRA	NK	4	1	0	NK
AMALIE REFINING COMPANY	MOLY ALL PURPOSE GREASE	LI-2M	2	1	2	NK

APPENDIX 10

BASIC COMMANDS FOR SYSTEM OPERATION

1. Log on computer system

2. For adding MSDS's to master data file call up the DATASHEET program by keying in ENTER. Instructions will appear on the CRT. To print, key in DATA and follow the further instructions on the CRT.

3. For matching, use the MATCH program by keying in MATCH and then following further instructions on the CRT. Printouts on the matched data are automatically made.

4. For sorting data, use MSSORT program by keying in SORT and following the further instructions on the CRT. Printouts of the sorted data are automatically made.

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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

FORTRAN computer programs were written in order to store and retrieve material safety data sheet (MSDS) information. The first program is used to add individual MSDS information to the master file whereas the second program allows the master file to be printed. The third and fourth programs allow for manipulation of the data in the master file such as searching and matching for specific information within the different information categories. Under development are programs used to extract certain data from the hazardous materials information system (HMIS) and

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item 20 -- continued

incorporate them into our own MSDS system. When completed, our on-line hazardous compound records will number approximately 16,000.